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Research Article

Contact Tracing in the Management of the Second Wave of SARS-Cov 2 Infection in Children: How Useful is it?

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Abstract

Background: Individuation and management of the contacts of confirmed COVID-19 infection cases allow quickly identifying and isolating any secondary cases and interrupt the transmission chain of the infection. Contact tracing is a very useful way to value the spread of the pandemic from SARS-Cov 2, however there are no paediatric data that have measured the effectiveness of this method.

Methods: From 30 October 2020 to 30 April 2021, during the second wave of the Covid pandemic, 19 primary care pediatricians reported suspected cases of SAR Cov 2 to the Public Health Service of the Piacenza district via a digital platform relating to a total pediatric population of about 17,500 children. All reported cases underwent a molecular PCR test as soon as possible and in any case within 48 hours. At the same time, Public Hygiene Service implemented contact tracing in the same pediatric population in all children who were in close contact with positive cases.

Results: On the basis of clinical suspicion reported on the database by primary care paediatricians, 1306 subjects underwent a molecular PCR nose pharyngeal swab for Covid-19 and 107 of them tested positive (8.2% of reports, 0.6% of the monitored population). In the same period, the Public Hygiene Service identified another 2582-suspected cases through contact-tracing and 1137 of them resulted positive for Covid-19 (44% of reports, 6.4% of the monitored population). Contact tracing has been about nine times more sensitive than the clinical criteria for identifying positive subjects in paediatric age, during the second wave of the SARS-Cov 2 pandemic (OR = 8.8, 7.1-10.9).

Conclusions: Our experience confirm the effectiveness of contact tracing for the managment of the SAR Cov 2 pandemic .It was about nine times more sensitive than the clinical criteria for identifying positive subjects in pediatric age, often asymptomatic, during the second wave of the Covid pandemic.

Keywords: SARS-Cov 2; Contact tracing; Childhood

Abbreviations: CT: Contact Tracing; PHS: Public Hygiene Services; PCP: Primary Care Paediatrician

Introduction

Covid-19 infection symptoms are often similar to those of many other viral infections in childhood: the infection commonly proceeds in a paucisymptomatic or in a completely asymptomatic way [1,2]. Starting from the first phase of the pandemic in Italy (February / March 2020), protective devices, spacing, contact tracing (CT) were considered useful and necessary to reduce the spread of Covid-19 infection; from the end of the year 2020, the vaccination against Covid-19 infection has been available, from the year 2022 also for children over 6 months of age. In Italy, the alert status for the presence of SARS-Cov 2 was officially declared on January 31, 2020 [3]. On February 23, 2020, at the same time with the creation of the first "red zone" in Italy (Codogno), schools were also closed in the Piacenza district, bordering the "red zone" [4]. Italy began a full lockdown on March 8, 2020 [5]. Piacenza district recorded one of the highest cumulative mortality rates (> 3 deaths per thousand inhabitants) in Italy, in the first phase of the pandemic [6]. Unfortunately, despite the Chinese experience, the spread of the infection speed in our geographical area, the severity and number of cases have caught the Public Hygiene Services (PHS) unprepared in the first phase of the pandemic, between February and May 2020. Due to the low impact of the infection in paediatric age, most of the available resources were directed elsewhere: in this emergency, most children with suspected SARS-Cov 2 infection were not tested due to the lack of nasal swabs and mild symptoms, which rarely required hospitalization. Due to lack of swabs, health personnel to perform swabs and to carry out tests in the laboratory, it was not even possible to apply contact tracing. In the first phase of the pandemic, primary care paediatricians (PCP) could report suspected cases to the PHS to carry out the molecular swab if epidemiological (close contact with a positive subject or from a red zone) and clinical [7] criteria were simultaneously present. For epidemiological purpose, one month after the end of lockdown (June 2020), National Health Service subjected many children with suspected infection (who previously did not undergo a diagnostic swab) to serological test of Covid-19 antibodies (CMIA Abbott). From this survey, which also involved the adult population, it was estimated that the number of cases affected by Covid-19 infection in the first wave was six times higher than that diagnosed by nose-pharyngeal molecular test [8]. From May 2020, the presence of clinical criteria was considered sufficient to report a suspected case of Covid-19 infection to the PHS [9]. At reopening of school activities in September 2020 and before the beginning of a second pandemic wave (which occurred from October 2020), the PHS, with the aim to limit the spread of the virus, scheduled the execution of the CT whenever there was a positive case. The purpose of this work was to verify the effectiveness of the CT activity in identifying Covid-19 positive paediatric subjects, compared to the only reporting of suspected cases based of clinical elements. This survey was possible because the Italian National Health Service provides that children up to the age of 14 are followed by PCP.

Materials and Methods

From October 30, 2020, PCP reported children with suspected symptoms of Covid-19 infection through a digital platform in order to make them undergo a swab. Clinical suspects were those reported in the national and international literature [10]. At the same time, the PHS carried out the CT of all the children who had been in close contact* with a positive case at school, in the family or in another setting. In any case, the nasopharyngeal molecular swab was carried out within 48 hours of reporting. All cases were included in a database in which each PCP was able to identify their patients who tested positive on the basis of clinical suspicion or through CT decided by the PHS. For statistical data analysis, Odds ratio and Chi-square test were employed. *close contact is

- a person who lives in the same home as a COVID-19 case;
- a person who had a direct physical contact with a COVID-19 case (for example a handshake);
- a person who had an unprotected direct contact with the secretions of a COVID19 case (for example, touching used paper handkerchiefs with bare hands);
- a person who had a direct contact (face to face) with a COVID-19 case, at a distance of less than 2 meters and at least 15 minutes;
- a person who has been in a closed environment with a COVID-19 case in the absence of suitable PPE;
- a person who, travelling by train, plane or any other means of transport, was seated within two seats in any direction relative to a COVID-19 case; the travel companions and the staff assigned to the section of the plane / train where the index case was sitting are also close contacts.

From 30 October 2020 to 30 April 2021, a quarantine of 14 days was applied for all close contacts with subjects Covid 19 positive [11].

Results

In the period October 2020 - April 2021, 19 PCP reported 1306 symptomatic patients to undergo a nasopharyngeal molecular swab for suspected Covid-19 infection from a population of 17500 children aged 0-14 yrs. The database analysis show that a positive

test for the molecular swab for Covid-19 was detected in 107 cases (8.2% of reports of PCP - 0.6% of the monitored population). The average age of the clinically suspected and swab-positive children was 6.9 yrs. (range 2 months-14 years, 52 M and 55 F). In the same period, the PHS, through the CT, identified another 2582 suspected cases and 1137 of them were positive for Covid-19 infection (44 % of reports of PHS, 6.4 % of the monitored population): the average age of swab-positive children was 7.2 yrs. (range 5 months-14 years, 573 M and 564 F), The odds ratio was 8.8 (7.1-10.9). The CT activity was about nine times more effective in identifying coronavirus infected subjects (Table 1).

	SARS-Cov 2 positive	SARS-Cov 2 negative	Total Swabs
By Contact Tracing	1137	1445	2582
By Clinical suspicion	107	1199	1306
	1244	2644	3888
Test	Value	1 Tailed p	2 Tailed p
uncorrected chi square	512.1	<0.0000001	<0.0000001
Yates corrected chi square	510.4	<0.0000001	<0.0000001
Mantel-Haenszel chi square	512	<0.0000001	<0.0000001
Test	Estimate	Lower	Upper
Odds Ratio	8.817	7.13	10.9

Table 1: Statistical analysis of nasopharyngeal swabs performed for clinical suspect (PCP) and for CT (PHS).

Discussion

Measures that proved to be fundamental to reduce the spread of the pandemic include the correct diagnosis (execution of the swab in suspected cases), the isolation of positive cases, the quarantine of close contacts and preventive measures such as use of protective devices, spacing and CT or identification of asymptomatic cases. Since December 2020, a new opportunity has been added: vaccination against Covid-19. There is much debate about the reasons that determine the presence of asymptomatic cases and why children often belong to this group [1]. Some of the patients identified through the CT subsequently became symptomatic, manifesting fever, cough, sore throat, headache, gastrointestinal disorders. Those would probably have been subjected anyway to tests for coronavirus in a short time. The purpose of our analysis was, however, to answer the question: is it possible to understand and quantify how much CT helps us to detect subjects infected with coronavirus, especially in childhood when most cases are paucisymptomatic or asymptomatic? Although there has also been much insistence on the importance of CT as a measure to limit the spread of the pandemic [12], this measure alone appears insufficient to limit the spread of the infection [13]. In this survey a population of 17500 children was monitored by the PCP from the clinical point of view and by the PHS from the preventive point of view through the CT performed whenever one of these children had close contact with a positive subject. The CT value as factual prevention strategy is not yet established: even if the effectiveness and efficacy of CT proved to be much higher than clinical symptoms consideration, we could not evaluate the efficiency because it was not possible to know direct and indirect costs associated with this survey methodology. The CT was about nine times higher than that of the clinical evaluation of suspected cases based on clinical data alone. Our data were collected when alpha variant of SARS-Cov 2 was prevalent in the European continent and in Italy [14]: probably the effectiveness and efficacy of CT could have been different if based on the degree of contagiousness R0 and RT of other SARS-Cov 2 variants such as delta and omicron and based on the severity of the disease and the resources needed to treat it. In an endemic situation, it is not excluded that other strategies to contain the spread of the virus, such as the use of molecular salivary swabs, could be more appropriate. In any case, at present, our opinion is that CT is a milestone of management of pandemic SARS-Cov 2.

Conclusions

Detection of COVID-19 infection based on clinical data alone is very ineffective. Therefore, notwithstanding the lack of data on cost/benefit analysis, the demonstrated effectiveness of CT activity appears very useful for the management of the SARS-Cov 2 pandemic since it was about nine times more effective than the clinical criteria for identifying positive subjects in childhood during the second wave of the Covid pandemic.

Declarations

Ethics approval and consent to participate: Not applicable : On October 13, 2021 the CE AVEN Ethics Committee declared on the basis of the regulation Art.3 available at https://www.aou.mo.it/ComitatoEticoAVEN that the data collection promoted by

the health professionals working in this belonging structure does not fall within the competence of the CE, in the absence of external Sponsors.

Consent for publication: not applicable

Availability of data and material: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests

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Authors' contributions: GG e RS conceptualized and designed the survey, EB,OR,GB,CM,SL,MC,MPL,PA,MC,LZ,MR,VA,PB, CF,FF,GG,CM,GD,RS collected the data, GG analysed the data, GG and RS wrote the manuscript, MR reviewed the manuscript. All authors approved the final manuscript as submitted and agreed to be accountable for all aspects of the work.

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